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DATE: Wednesday, March 02, 2005

<u>Hide?</u>	<u>Set Name</u>	<u>Query</u>	<u>Hit Count</u>
<i>DB=PGPB,USPT; PLUR=YES; OP=ADJ</i>			
<input type="checkbox"/>	L10	l6 and (guanine 37 or g37)	0
<input type="checkbox"/>	L9	l6 and (val13 or val389)	0
<input type="checkbox"/>	L8	l6 and (valine 13 or valine 389)	0
<input type="checkbox"/>	L7	L6 and dna fragment	26
<input type="checkbox"/>	L6	L5 and (fragment or portion)	213
<input type="checkbox"/>	L5	L4 and chlamydomonas	213
<input type="checkbox"/>	L4	L3 and transgenic	401
<input type="checkbox"/>	L3	L2 and plant	464
<input type="checkbox"/>	L2	L1 and herbicide	476
<input type="checkbox"/>	L1	ppo or protoporphyrinogen oxidase	5481

END OF SEARCH HISTORY

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NEWS 8 DEC 15 MEDLINE update schedule for December 2004
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NEWS 10 DEC 17 COMPUAB reloaded; updating to resume; current-awareness alerts (SDIs) affected
NEWS 11 DEC 17 SOLIDSTATE reloaded; updating to resume; current-awareness alerts (SDIs) affected
NEWS 12 DEC 17 CERAB reloaded; updating to resume; current-awareness alerts (SDIs) affected
NEWS 13 DEC 17 THREE NEW FIELDS ADDED TO IFIPAT/IFIUDB/IFICDB
NEWS 14 DEC 30 EPFULL: New patent full text database to be available on STN
NEWS 15 DEC 30 CAPLUS - PATENT COVERAGE EXPANDED
NEWS 16 JAN 03 No connect-hour charges in EPFULL during January and February 2005
NEWS 17 FEB 25 CA/CAPLUS - Russian Agency for Patents and Trademarks (ROSPATENT) added to list of core patent offices covered
NEWS 18 FEB 10 STN Patent Forums to be held in March 2005
NEWS 19 FEB 16 STN User Update to be held in conjunction with the 229th ACS National Meeting on March 13, 2005
NEWS 20 FEB 28 PATDPAFULL - New display fields provide for legal status data from INPADOC
NEWS 21 FEB 28 BABS - Current-awareness alerts (SDIs) available
NEWS 22 FEB 28 MEDLINE/LMEDLINE reloaded
NEWS 23 MAR 02 GBFULL: New full-text patent database on STN

NEWS EXPRESS JANUARY 10 CURRENT WINDOWS VERSION IS V7.01a, CURRENT MACINTOSH VERSION IS V6.0c(ENG) AND V6.0Jc(JP), AND CURRENT DISCOVER FILE IS DATED 10 JANUARY 2005

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L6 ANSWER 6 OF 11 AGRICOLA Compiled and distributed by the National Agricultural Library of the Department of Agriculture of the United States of America. It contains copyrighted materials. All rights reserved.
 (2005) on STN DUPLICATE 1

TI Isolation and characterization of a mutant **protoporphyrinogen oxidase** gene from **Chlamydomonas reinhardtii** conferring resistance to porphyric herbicides.

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 (2005) on STN DUPLICATE 2

TI Characterization of a mutant of **Chlamydomonas reinhardtii** resistant to **protoporphyrinogen oxidase** inhibitors.

L6 ANSWER 8 OF 11 CAPLUS COPYRIGHT 2005 ACS on STN

TI Isolation of characterization of a **Chlamydomonas reinhardtii** mutant resistant to photobleaching herbicides

L6 ANSWER 9 OF 11 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN

TI Mode of action studies on a chiral diphenyl ether peroxidizing herbicide: Correlation between differential inhibition of **protoporphyrinogen IX oxidase** activity and induction of tetrapyrrole accumulation by the enantiomers.

L6 ANSWER 10 OF 11 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN

TI Isolation and characterization of a **Chlamydomonas reinhardtii** mutant resistant to an experimental herbicide S-23142, which inhibits chlorophyll synthesis.

L6 ANSWER 11 OF 11 CAPLUS COPYRIGHT 2005 ACS on STN

TI Treatment of polycythemia vera or hyperbilirubinemia with inhibitors of **protoporphyrinogen** conversion to heme

=> d ab

L6 ANSWER 1 OF 11 CAPLUS COPYRIGHT 2005 ACS on STN

AB The invention relates to methods and vectors for plant and algae plastid transformation. The method includes two phases of selection with first selection phase using a non-lethal compound and a second selection phase using a lethal compound

=> d pi

L6	ANSWER 1 OF 11 CAPLUS COPYRIGHT 2005 ACS on STN	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004035734	A2	20040429	WO 2003-US31941		20031007
		W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW			
		RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG		US 2004133937	A1 20040708 US 2003-680824 20031007

=> s 14 and transgenic
L7 54 L4 AND TRANSGENIC

=> dup rem 17
PROCESSING COMPLETED FOR L7
L8 44 DUP REM L7 (10 DUPLICATES REMOVED)

=> s 18 and valine
L9 2 L8 AND VALINE

=> d 1-2 ti

L9 ANSWER 1 OF 2 CAPLUS COPYRIGHT 2005 ACS on STN
TI Plant genes for protoporphyrinogen oxidases and the development of herbicide-resistant forms of the enzyme

L9 ANSWER 2 OF 2 CAPLUS COPYRIGHT 2005 ACS on STN
TI Genes encoding herbicide inhibitor-resistant mutants of plant protoporphyrinogen oxidase and transgenic plants expressing same

=> s 14 and (390 or 365 or 389)
L10 4 L4 AND (390 OR 365 OR 389)

=> dup rem 110
PROCESSING COMPLETED FOR L10
L11 2 DUP REM L10 (2 DUPLICATES REMOVED)

=> d 1-2 ti

L11 ANSWER 1 OF 2 CAPLUS COPYRIGHT 2005 ACS on STN
TI Genes encoding herbicide inhibitor-resistant mutants of plant protoporphyrinogen oxidase and transgenic plants expressing same

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(2005) on STN DUPLICATE 1
TI Isolation and characterization of a mutant protoporphyrinogen oxidase gene from Chlamydomonas reinhardtii conferring resistance to porphyric herbicides.

=> s ((boynton, j?) or (boynton j?))/au
L12 362 ((BOYNTON, J?) OR (BOYNTON J?))/AU

=> s 112 and protoporphyrinogen
L13 10 L12 AND PROTOPORPHYRINOGEN

=> dup rem 113
PROCESSING COMPLETED FOR L13
L14 5 DUP REM L13 (5 DUPLICATES REMOVED)

=> d 1-5 ti

L14 ANSWER 1 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN
TI Methods of conferring resistance to herbicides inhibiting protoporphyrinogen biosynthesis to crop plants

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of America. It contains copyrighted materials. All rights reserved.
 (2005) on STN DUPLICATE 1

TI Isolation and characterization of a mutant **protoporphyrinogen**
 oxidase gene from Chlamydomonas reinhardtii conferring resistance to
 porphyric herbicides.

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 Agricultural Library of the Department of Agriculture of the United States
 of America. It contains copyrighted materials. All rights reserved.
 (2005) on STN DUPLICATE 2

TI Characterization of a mutant of Chlamydomonas reinhardtii resistant to
protoporphyrinogen oxidase inhibitors.

L14 ANSWER 4 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 3

TI Isolation of characterization of a Chlamydomonas reinhardtii mutant
 resistant to photobleaching herbicides

L14 ANSWER 5 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 4

TI Isolation and characterization of a Chlamydomonas reinhardtii mutant
 resistant to an experimental herbicide S-23142, which inhibits chlorophyll
 synthesis

=> d 1 ab

L14 ANSWER 1 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN

AB Genes for herbicide-resistant variants of **protoporphyrinogen**
 oxidase are described for use in creating herbicide-resistant crop plants.
 Resistance to these herbicides should allow for simpler and more effective
 weed management, and increase the value of these herbicides for
 agricultural use. The Chlamydomonas reinhardtii gene for
protoporphyrinogen oxidase is identified and herbicide-resistance
 alleles created. **Protoporphyrinogen** oxidase genes of
 Chlamydomonas reinhardtii and Arabidopsis thaliana were cloned by
 complementation of a hemG mutant of Escherichia coli. In addition, the
 present invention provides methods to evaluate the inhibitory effects of
 test compds. on **protoporphyrinogen** oxidase activity, as well as
 methods to identify **protoporphyrinogen** oxidase inhibitors among
 test compds. Preferred cloned DNA fragments encoding
protoporphyrinogen oxidase enzymes resistant to porphyric
 herbicides are also described.

=> d pi

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9829554	A1	19980709	WO 1996-US20415	19961227
	W: AU, CA, JP, US				
	RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	CA 2276053	AA	19980709	CA 1996-2276053	19961227
	AU 9714298	A1	19980731	AU 1997-14298	19961227
	AU 739948	B2	20011025		
	EP 1007703	A1	20000614	EP 1996-944519	19961227
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
	JP 2002528036	T2	20020827	JP 1998-529941	19961227

=> d 2 ab

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(2005) on STN

DUPLICATE 1

AB In plant and algal cells, inhibition of the enzyme **protoporphyrinogen oxidase** (Protox) by the N-phenyl heterocyclic herbicide S-23142 causes massive protoporphyrin IX accumulation, resulting in membrane deterioration and cell lethality in the light. We have identified a 40.4 kb genomic fragment encoding S-23142 resistance by using transformation to screen an indexed cosmid library made from nuclear DNA of the dominant rs-3 mutant of *Chlamydomonas reinhardtii*. A 10.0 kb HindIII subclone (Hind 10) of this insert yields a high frequency of herbicide-resistant transformants, consistent with frequent non-homologous integration of the complete RS-3 gene. A 3.4 kb XhoI subfragment (Xho3.4) yields rare herbicide-resistant transformants, suggestive of homologous integration of a portion of the coding sequence containing the mutation. Molecular and genetic analysis of the transformants localized the rs-3 mutation conferring S-23142 resistance to the Xho3.4 fragment, which was found to contain five putative exons encoding a protein with identity to the C-terminus of the *Arabidopsis* Protox enzyme. A cDNA clone containing a 1698 bp ORF that encodes a 563 amino acid peptide with 51% and 53% identity to *Arabidopsis* and tobacco Protox I, respectively, was isolated from a wild-type *C. reinhardtii* library. Comparison of the wild-type cDNA sequence with the putative exon sequences present in the mutant Xho3.4 fragment revealed a G leads to A change at 291 in the first putative exon, resulting in a Val leads to Met substitution at a conserved position equivalent to Val-389 of the wild-type *C. reinhardtii* cDNA. A sequence comparison of genomic Hind10 fragments from *C. reinhardtii* rs-3 and its wild-type progenitor CC-407 showed this G leads to A change at the equivalent position (5751) within exon 10.

=> d 2 so

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(2005) on STN

DUPLICATE 1

SO Plant molecular biology, Nov 1998. Vol. 38, No. 5. p. 839-859
Publisher: Dordrecht : Kluwer Academic Publishers.
CODEN: PMBIDB; ISSN: 0167-4412

=> d 3 ab

L14 ANSWER 3 OF 5 AGRICOLA Compiled and distributed by the National Agricultural Library of the Department of Agriculture of the United States of America. It contains copyrighted materials. All rights reserved.
(2005) on STN

DUPLICATE 2

AB A nuclear mutant of *Chlamydomonas reinhardtii* (rs-3) is resistant to several herbicides which inhibit the enzyme **protoporphyrinogen oxidase** (Protox) in plants, including S-23142 [N-(4-chloro-2-fluoro-5-propargyloxy)-phenyl-3,4, 5,6-tetrahydrophthalimide], acifluorfenethyl, oxyfluorfen, and oxadiazon. Protox enzyme activity in Percoll-purified chloroplast thylakoids from rs-3 is less sensitive to S-23142 than that from wild type, indicating that the rs-3 mutation either directly or indirectly confers resistance on the enzyme. Genetic analysis of rs-3 showed that resistance results from a single dominant nuclear mutation that maps to linkage group IX, 13.7 and 12.3 map units from sr-1 and pf-16 respectively. Efforts to identify the resistance gene from a cosmic library of rs-3 nuclear DNA by transformation have yielded one S-23142 resistant isolate from the cell wall-less arginine-requiring strain CC-425 (arg-2, cw-15). Since no isolates resistant to S-23142 were seen in control experiments, this suggests that the resistant isolate is a transformant and that the rs-3 gene can be isolated by screening individual cosmic clones by transformation.

=> d 3 so

L14 ANSWER 3 OF 5 AGRICOLA Compiled and distributed by the National Agricultural Library of the Department of Agriculture of the United States of America. It contains copyrighted materials. All rights reserved. (2005) on STN DUPLICATE 2

SO ACS symposium series, 1994. No. 559. p. 91-104
Publisher: Washington, D.C. : American Chemical Society, 1974-
CODEN: ACSMC8; ISSN: 0097-6156

=> d 4 ab

L14 ANSWER 4 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 3

AB A review with 21 refs. of the mode of action of N-phenylimide photobleaching herbicides in comparison with di-Ph ether herbicides. These N-phenylimide herbicides as well as di-Ph ether herbicides induce protoporphyrin IX accumulation and inhibit **protoporphyrinogen** oxidase activity at extremely low concns. in higher plants. The binding of a 14C-labeled N-phenylimide herbicide S-23121 [N-[4-chloro-2-fluoro-5-[(1-methyl-2-propynyl)oxy]phenyl]-3,4,5,6-tetrahydروphthalimide] to the solubilized plastid fractions of greening corn seedlings is competed by the di-Ph ether herbicide acifluorfen-Et, but not by diuron, an inhibitor of photosynthetic electron transport. These results indicate a similar mode of action for both N-phenylimide and di-Ph ether herbicides. In order to investigate the mechanism of photobleaching herbicides at the mol. level, a strain of Chlamydomonas reinhardtii RS-3 resistant to N-phenylimide S-23142 [N-(4-chloro-2-fluoro-5-propargyloxyphenyl)-3,4,5,6-tetrahydروphthalimide] was isolated by mutagenesis with N-methyl-N'-nitro-N-nitrosoguanidine. The 90% inhibition concentration of N-phenylimide S-23142 for growth of RS-3 was 100 times higher than that for wild type. Maximum accumulation of protoporphyrin IX was reached at 0.03 μM of S-23142 for the wild type and 3 μM for RS-3. RS-3 was resistant to oxadiazon, oxyfluorfen and acifluorfen-Et which had been shown to have the same mechanism of action as N-phenylimide herbicides, but not to paraquat, diuron or fluridone. Genetic anal. of RS-3 strain showed that the resistance results from a dominant mutation (rs-3) in the nuclear genome. The magnesium protoporphyrin IX synthesizing activity from 5-aminolevulinic acid in chloroplast fragments isolated from RS-3 was less sensitive to S-23142 than that from wild type (CC-407). **Protoporphyrinogen** oxidase activity in Percoll-purified chloroplasts from RS-3 was also less sensitive to S-23142 than that from wild type. Thus, the resistance of RS-3 is specific for photobleaching herbicides, and the mutation is related to **protoporphyrinogen** oxidase, the primary site of the photobleaching herbicide action.

=> d 4 so

L14 ANSWER 4 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 3

SO Zeitschrift fuer Naturforschung, C: Journal of Biosciences (1993), 48(3-4), 339-44
CODEN: ZNCBDA; ISSN: 0341-0382

=> d 5 ab

L14 ANSWER 5 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 4

AB A mutant of Chlamydomonas reinhardtii rs-3 was isolated from a wild type strain CC-407. The rs-3 mutant shows 100 fold resistance to an exptl. herbicide S-23142 [N-(4-chloro-2-fluoro-5-propargyloxy)-phenyl-3,4,5,6-tetrahydروphthalimide] which inhibits the **protoporphyrinogen**

oxidase (Proto-ox) in the chlorophyll synthesis pathway and induces massive accumulation of porphyrins in cells. Repeated backcrosses of rs-3 to wild type stocks CC-124 and CC-125 yielded tetrads which segregated two herbicide sensitive and two resistant products, indicating that resistance results from a mutation in the nuclear genome. Synthesis of protoporphyrin IX from **protoporphyrinogen** in isolated chloroplast fragments from rs-3 is significantly less inhibited by S-23142 than in CC-407, indicating that the rs-3 mutation affects Proto-ox. Anal. of rs-3 arg-2/+ arg-7 diploids shows that the rs-3 mutation is dominant at the levels of both cell viability and Proto-ox enzyme resistance.

=> d 5 so

L14 ANSWER 5 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 4
SO Res. Photosynth., Proc. Int. Congr. Photosynth., 9th (1992), Volume 3,
567-70. Editor(s): Murata, Norio. Publisher: Kluwer, Dordrecht, Neth.
CODEN: 59IZAS

=> s ((gillham n?) or (gillham, n?))/au
L15 311 ((GILLHAM N?) OR (GILLHAM, N?))/AU

=> s l15 and protoporphyrinogen
L16 10 L15 AND PROTOPORPHYRINOGEN

=> dup rem l16
PROCESSING COMPLETED FOR L16
L17 5 DUP REM L16 (5 DUPLICATES REMOVED)

=> d 1-5 ti

L17 ANSWER 1 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN
TI Methods of conferring resistance to herbicides inhibiting
protoporphyrinogen biosynthesis to crop plants

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(2005) on STN DUPLICATE 1
TI Isolation and characterization of a mutant **protoporphyrinogen**
oxidase gene from Chlamydomonas reinhardtii conferring resistance to
porphyric herbicides.

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(2005) on STN DUPLICATE 2
TI Characterization of a mutant of Chlamydomonas reinhardtii resistant to
protoporphyrinogen oxidase inhibitors.

L17 ANSWER 4 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 3
TI Isolation of characterization of a Chlamydomonas reinhardtii mutant
resistant to photobleaching herbicides

L17 ANSWER 5 OF 5 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 4
TI Isolation and characterization of a Chlamydomonas reinhardtii mutant
resistant to an experimental herbicide S-23142, which inhibits chlorophyll
synthesis

=> s ((randolph-anderson, b?) or (randolph-anderson b?))/au
L18 24 ((RANDOLPH-ANDERSON, B?) OR (RANDOLPH-ANDERSON B?))/AU

=> dup rem 118
PROCESSING COMPLETED FOR L18
L19 13 DUP REM L18 (11 DUPLICATES REMOVED)

=> d 1-13 ti

L19 ANSWER 1 OF 13 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN
TI Evidence consistent with linkage to 15q of a non-chromosome 4 linked FSHD family.

L19 ANSWER 2 OF 13 CAPLUS COPYRIGHT 2005 ACS on STN
TI Methods of conferring resistance to herbicides inhibiting protoporphyrinogen biosynthesis to crop plants

L19 ANSWER 3 OF 13 AGRICOLA Compiled and distributed by the National Agricultural Library of the Department of Agriculture of the United States of America. It contains copyrighted materials. All rights reserved.
(2005) on STN DUPLICATE 1
TI Isolation and characterization of a mutant protoporphyrinogen oxidase gene from Chlamydomonas reinhardtii conferring resistance to porphyric herbicides.

L19 ANSWER 4 OF 13 AGRICOLA Compiled and distributed by the National Agricultural Library of the Department of Agriculture of the United States of America. It contains copyrighted materials. All rights reserved.
(2005) on STN DUPLICATE 2
TI The chloroplast gene encoding ribosomal protein S4 in Chlamydomonas reinhardtii spans an inverted repeat--unique sequence junction and can be mutated to suppress a streptomycin dependence mutation in ribosomal protein S12.

L19 ANSWER 5 OF 13 CAPLUS COPYRIGHT 2005 ACS on STN
TI Molecular genetics of chloroplast ribosomes in Chlamydomonas reinhardtii

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(2005) on STN DUPLICATE 3
TI Further characterization of the respiratory deficient dum-1 mutation of Chlamydomonas reinhardtii and its use as a recipient for mitochondrial transformation.

L19 ANSWER 7 OF 13 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN
TI Further characterization of the respiratory deficient dum-1 mutation of Chlamydomonas reinhardtii and its use as a recipient for mitochondrial transformation.

L19 ANSWER 8 OF 13 AGRICOLA Compiled and distributed by the National Agricultural Library of the Department of Agriculture of the United States of America. It contains copyrighted materials. All rights reserved.
(2005) on STN
TI Molecular genetics of chloroplast ribosomes in Chlamydomonas.

L19 ANSWER 9 OF 13 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN
TI ENGINEERING THE CHLAMYDOMONAS CHLOROPLAST GENOME.

L19 ANSWER 10 OF 13 AGRICOLA Compiled and distributed by the National Agricultural Library of the Department of Agriculture of the United States of America. It contains copyrighted materials. All rights reserved.
(2005) on STN DUPLICATE 4
TI Transformation of chloroplast ribosomal RNA genes in Chlamydomonas: molecular and genetic characterization of integration events.

L19 ANSWER 11 OF 13 CAPLUS COPYRIGHT 2005 ACS on STN

TI Manipulating the chloroplast genome of Chlamydomonas. Molecular genetics and transformation

L19 ANSWER 12 OF 13 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 5

TI Electrophoretic and immunological comparisons of chloroplast and prokaryotic ribosomal proteins reveal that certain families of large subunit proteins are evolutionarily conserved

L19 ANSWER 13 OF 13 AGRICOLA Compiled and distributed by the National Agricultural Library of the Department of Agriculture of the United States of America. It contains copyrighted materials. All rights reserved. (2005) on STN DUPLICATE 6

TI Chloroplast transformation in Chlamydomonas with high velocity microprojectiles.

=> d 2 ab

L19 ANSWER 2 OF 13 CAPLUS COPYRIGHT 2005 ACS on STN

AB Genes for herbicide-resistant variants of protoporphyrinogen oxidase are described for use in creating herbicide-resistant crop plants. Resistance to these herbicides should allow for simpler and more effective weed management, and increase the value of these herbicides for agricultural use. The Chlamydomonas reinhardtii gene for protoporphyrinogen oxidase is identified and herbicide-resistance alleles created. Protoporphyrinogen oxidase genes of Chlamydomonas reinhardtii and Arabidopsis thaliana were cloned by complementation of a hemG mutant of Escherichia coli. In addition, the present invention provides methods to evaluate the inhibitory effects of test compds. on protoporphyrinogen oxidase activity, as well as methods to identify protoporphyrinogen oxidase inhibitors among test compds. Preferred cloned DNA fragments encoding protoporphyrinogen oxidase enzymes resistant to porphyrinic herbicides are also described.

=> d 2 so

L19 ANSWER 2 OF 13 CAPLUS COPYRIGHT 2005 ACS on STN
SO PCT Int. Appl., 109 pp.
CODEN: PIXXD2

=> d 2 pi

L19 ANSWER 2 OF 13 CAPLUS COPYRIGHT 2005 ACS on STN

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 9829554	A1	19980709	WO 1996-US20415	19961227
W: AU, CA, JP, US				
RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
CA 2276053	AA	19980709	CA 1996-2276053	19961227
AU 9714298	A1	19980731	AU 1997-14298	19961227
AU 739948	B2	20011025		
EP 1007703	A1	20000614	EP 1996-944519	19961227
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,				
IE, FI				
JP 2002528036	T2	20020827	JP 1998-529941	19961227

=> s ((ishige, f?) or (ishige f?))/au
L20 29 ((ISHIGE, F?) OR (ISHIGE F?))/AU

=> s l20 and protoporphyrinogen
L21 4 L20 AND PROTOPORPHYRINOGEN

```
=> dup rem l21
PROCESSING COMPLETED FOR L21
L22      2 DUP REM L21 (2 DUPLICATES REMOVED)

=> d 1-2 ti

L22 ANSWER 1 OF 2 CAPLUS COPYRIGHT 2005 ACS on STN
TI Methods of conferring resistance to herbicides inhibiting
      protoporphyrinogen biosynthesis to crop plants

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(2005) on STN                               DUPLICATE 1
TI Isolation and characterization of a mutant protoporphyrinogen
      oxidase gene from Chlamydomonas reinhardtii conferring resistance to
      porphyric herbicides.

=> s ((sato, r?) or (sato r?))/au
L23      3007 ((SATO, R?) OR (SATO R?))/AU

=> s 123 and protoporphyrinogen
L24      11 L23 AND PROTOPORPHYRINOGEN

=> dup rem l24
PROCESSING COMPLETED FOR L24
L25      6 DUP REM L24 (5 DUPLICATES REMOVED)

=> d 1-6 ti

L25 ANSWER 1 OF 6 CAPLUS COPYRIGHT 2005 ACS on STN
TI Flumioxazin as a new herbicide

L25 ANSWER 2 OF 6 CAPLUS COPYRIGHT 2005 ACS on STN
TI Methods of conferring resistance to herbicides inhibiting
      protoporphyrinogen biosynthesis to crop plants

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(2005) on STN                               DUPLICATE 1
TI Isolation and characterization of a mutant protoporphyrinogen
      oxidase gene from Chlamydomonas reinhardtii conferring resistance to
      porphyric herbicides.

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(2005) on STN                               DUPLICATE 2
TI Characterization of a mutant of Chlamydomonas reinhardtii resistant to
      protoporphyrinogen oxidase inhibitors.

L25 ANSWER 5 OF 6 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 3
TI Isolation of characterization of a Chlamydomonas reinhardtii mutant
      resistant to photobleaching herbicides

L25 ANSWER 6 OF 6 CAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 4
TI Isolation and characterization of a Chlamydomonas reinhardtii mutant
      resistant to an experimental herbicide S-23142, which inhibits chlorophyll
      synthesis

=> d ab
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L25 ANSWER 1 OF 6 CAPLUS COPYRIGHT 2005 ACS on STN
AB Flumioxazin was discovered and developed by Sumitomo Chemical Company.
Flumioxazin is used as an herbicide to control a wide variety of weeds in
crop field, such as soybeans, peanut and tree fruit field, and non-crop
area. Flumioxazin inhibits **protoporphyrinogen** oxidase of
chlorophyll biosynthesis pathway. Flumioxazin has very big margin of
safety against environment and human health. Flumioxazin had already been
launched in South America, France, China and Japan, and registered in the
United States within 2001.

=> d so

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SO Sumitomo Kagaku (Osaka) (2001), (1), 14-25
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